

App. No. 09/980,109
Office Action Dated May 8, 2006

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Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Claims 1, 4, 11, and 24 are amended.

Listing of Claims:

1. (Currently Amended) An optical information recording method, comprising recording information as a mark by irradiating an optical information recording medium with a laser beam while varying a waveform of power of the laser beam to cause a change in optical characteristics of a photosensitive recording film ~~so that information is recorded as a mark,~~

wherein an area in the mark where a width of the mark is constant and a space area where the width is zero each are defined as a unit recording area,

information is represented by at least three different widths of the unit recording areas, and

the unit recording area having a predetermined length and a predetermined width is formed by correcting leading and trailing edge positions of a recording pulse for recording the unit recording area other than the space area in accordance with a width of the unit recording area to be recorded.

2. (Original) The optical information recording method according to claim 1, wherein the unit recording area having a predetermined length and a predetermined width is formed by correcting the leading and trailing edge positions of the recording pulse in accordance with a combination of a width and a length of the unit recording area to be recorded.

3. (Original) The optical information recording method according to claim 2, wherein the unit recording area having a predetermined length and a predetermined width is formed by correcting the leading edge position of the recording pulse in accordance with a combination of a

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width of the unit recording area to be recorded, a length thereof and a length of the preceding unit recording area and by correcting the trailing edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a length thereof and a length of the next unit recording area.

4. (Currently Amended) An optical information recording method, comprising recording information as a mark by irradiating an optical information recording medium with a laser beam while varying a waveform of power of the laser beam to cause a change in optical characteristics of a photosensitive recording film ~~so that information is recorded as a mark,~~

wherein an area in the mark where a width of the mark is constant and a space area where the width is zero each are defined as a unit recording area,

information is represented by at least three different widths of the unit recording areas, and

the unit recording area having a predetermined length and a predetermined width is formed by correcting a leading edge position of a recording pulse for recording the unit recording area other than the space area in accordance with a combination of a width of the unit recording area to be recorded and a width of the preceding unit recording area and by correcting a trailing edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded and a width of the next unit recording area.

5. (Original) The optical information recording method according to claim 4, wherein the unit recording area having a predetermined length and a predetermined width is formed by correcting the leading edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a width of the preceding unit recording area and a length of the unit recording area to be recorded and by correcting the trailing edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a width of the next unit recording area and a length of the unit recording area to be recorded.

6. (Original) The optical information recording method according to claim 5, wherein the unit recording area having a predetermined length and a predetermined width is formed by

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correcting the leading edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a width of the preceding unit recording area, a length of the unit recording area to be recorded and a length of the preceding unit recording area and by correcting the trailing edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a width of the next unit recording area, a length of the unit recording area to be recorded and a length of the next unit recording area.

7. (Previously Presented) The optical information recording method according to claim 1, wherein amounts of correction of the leading and trailing edge positions of the recording pulse are determined by recording and reproducing a predetermined recording test pattern before recording the information.

8. (Previously Presented) The optical information recording method according to claim 1, wherein a predetermined reproduction test pattern is recorded on the optical information recording medium so as to determine reproduction conditions of the information by reproducing the reproduction test pattern before reproducing the information.

9. (Previously Presented) The optical information recording method according to claim 1, wherein information is further represented by the leading and trailing edges of the unit recording area.

10. (Previously Presented) The optical information recording method according to claim 1, wherein power of the laser beam is lowered to a bias level in a portion between a first recording pulse for recording a first unit recording area and a second recording pulse for recording a second unit recording area when the first and second unit recording areas, each having a different mark width other than zero, are recorded continuously as the unit recording areas.

11. (Currently Amended) The optical information recording method according to claim 1, further comprising selecting whether the information is represented by a width of the unit recording area or by edges of the mark in accordance with a type of information.

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12. (Original) An optical information recording medium, comprising a photosensitive recording film whose optical characteristics are changed by laser beam irradiation,
wherein an area where a width of a mark that is formed on the photosensitive recording film by the laser beam irradiation is constant and a space area where the width is zero each are defined as a unit recording area, and

an identifier for identifying whether information is represented by a width of the unit recording area is recorded previously on a predetermined area.

13. (Original) An optical information recording medium, comprising a photosensitive recording film whose optical characteristics are changed by laser beam irradiation,
wherein an area where a width of a mark that is formed on the photosensitive recording film by the laser beam irradiation is constant and a space area where the width is zero each are defined as a unit recording area, and

amounts of correction of leading and trailing edge positions of a recording pulse for recording the unit recording area other than the space area that are determined by a width of the unit recording area to be recorded are recorded previously on a predetermined area as information.

14. (Original) An optical information recording apparatus for recording information on an optical information recording medium,

the optical information recording medium being irradiated with a laser beam having a plurality of powers while switching the power of the laser beam to cause a change in optical characteristics of a photosensitive recording film so that a mark is formed,

wherein an area in the mark where a width of the mark is constant and a space area where the width is zero each are defined as a unit recording area, and information is represented by at least three different widths of the unit recording areas,

the apparatus comprising:

a modulation means for modulating recording information to provide modulated information;

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a multi-valued means for converting the modulated information to multi-valued information;

a recording pulse generation means for generating a recording pulse based on the multi-valued information;

a recording power control means for controlling a recording power in accordance with a width of the unit recording area to be recorded that corresponds to the multi-valued information;

an edge position correction means for correcting leading and trailing edge positions of the recording pulse in accordance with the width of the unit recording area to be recorded; and

a recording means for recording the information on the optical information recording medium by irradiation of the laser beam based on the recording power and the corrected recording pulse.

15. (Original) The optical information recording apparatus according to claim 14, wherein the edge position correction means corrects the leading and trailing edge positions of the recording pulse in accordance with a combination of a width and a length of the unit recording area to be recorded.

16. (Original) The optical information recording apparatus according to claim 15, wherein the edge position correction means corrects the leading edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a length thereof and a length of the preceding unit recording area and the trailing edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a length thereof and a length of the next unit recording area.

17. (Original) An optical information recording apparatus for recording information on an optical information recording medium,

the optical information recording medium being irradiated with a laser beam having a plurality of powers while switching the power of the laser beam to cause a change in optical characteristics of a photosensitive recording film so that a mark is formed,

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wherein an area in the mark where a width of the mark is constant and a space area where the width is zero each are defined as a unit recording area, and information is represented by at least three different widths of the unit recording areas,

the apparatus comprising:

a modulation means for modulating recording information to provide modulated information;

a multi-valued means for converting the modulated information to multi-valued information;

a recording pulse generation means for generating a recording pulse based on the multi-valued information;

a recording power control means for controlling a recording power in accordance with a width of the unit recording area to be recorded that corresponds to the multi-valued information;

an edge position correction means for correcting a leading edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded and a width of the preceding unit recording area and for correcting a trailing edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded and a width of the next unit recording area; and

a recording means for recording the information on the optical information recording medium by irradiation of the laser beam based on the recording power and the corrected recording pulse.

18. (Original) The optical information recording apparatus according to claim 17, wherein the edge position correction means corrects the leading edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a width of the preceding unit recording area and a length of the unit recording area to be recorded, and the trailing edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a width of the next unit recording area and a length of the unit recording area to be recorded.

19. (Original) The optical information recording apparatus according to claim 18, wherein the edge position correction means corrects the leading edge position of the recording pulse in

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accordance with a combination of a width of the unit recording area to be recorded, a width of the preceding unit recording area, a length of the unit recording area to be recorded and a length of the preceding unit recording area, and the trailing edge position of the recording pulse in accordance with a combination of a width of the unit recording area to be recorded, a width of the next unit recording area, a length of the unit recording area to be recorded and a length of the next unit recording area.

20. (Previously Presented) The optical information recording method according to claim 4, wherein amounts of correction of the leading and trailing edge positions of the recording pulse are determined by recording and reproducing a predetermined recording test pattern before recording the information.

21. (Previously Presented) The optical information recording method according to claim 4, wherein a predetermined reproduction test pattern is recorded on the optical information recording medium so as to determine reproduction conditions of the information by reproducing the reproduction test pattern before reproducing the information.

22. (Previously Presented) The optical information recording method according to claim 4, wherein information is further represented by the leading and trailing edges of the unit recording area.

23. (Previously Presented) The optical information recording method according to claim 4, wherein power of the laser beam is lowered to a bias level in a portion between a first recording pulse for recording a first unit recording area and a second recording pulse for recording a second unit recording area when the first and second unit recording areas, each having a different mark width other than zero, are recorded continuously as the unit recording areas.

24. (Currently Amended) The optical information recording method according to claim 4, further comprising selecting whether the information is represented by a width of the unit recording area or by edges of the mark in accordance with a type of information.

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